

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A high slew rate amplifying circuit for a TFT-type of LCD system, the amplifying circuit comprising:
 - an operational amplifier;
 - a pull-up transistor connected to an output of the operational amplifier;
 - a pull-down transistor connected to the output of the operational amplifier;
 - a control circuit to selectively actuate the pull-up transistor and the pull-down transistor, respectively, so that a combined operative duration of the pull-up and pull-down transistors is significantly shorter than an operative duration of the operational amplifier.
2. (Original) The amplifying circuit of claim 1, wherein the control circuit is operable to selectively actuate each of the pull-up and pull-down transistors, respectively, for one of the following: less than about 1/2 of the period of a polarity signal; or less than the period of an output enable signal.
3. (Original) The amplifying circuit of claim 2, wherein the control circuit is operable to selectively actuate each of the pull-up and pull-down transistors, respectively, for one of the following: less than about 1/20 period of the polarity signal; or less than about 1/10 of the period of the output enable signal.
4. (Original) The amplifying circuit of claim 3, wherein the control circuit is operable to selectively actuate each of the pull-up and pull-down transistors, respectively, for one of the following: less than about 1/200 of the period of the polarity signal; or less than about 1/100 of the period of the output enable signal.

5. (Currently Amended) A high slew rate amplifying ~~The amplifying circuit of claim 1, for a TFT-~~
type of LCD system, the amplifying circuit comprising:

an operational amplifier;

a pull-up transistor connected to an output of the operational amplifier;

a pull-down transistor connected to the output of the operational amplifier; and

a control circuit to selectively actuate the pull-up transistor and the pull-down transistor,
respectively, wherein the control circuit includes: including at least the following,

a first one-shot circuit to generate a first one-shot signal that determines actuation time of
the pull-up transistor; and

a second one-shot rising circuit to generate a second one-shot signal that determines
actuation time of the pull-down transistor.

6. (Original) The amplifying circuit of claim 5, wherein the first and second one-shot signals are determined as a function of an output enable signal.

7. (Original) The amplifying circuit of claim 5, wherein each of the first and second one-shot circuits includes at least one delay unit, respectively, to delay a transition in the respective one-shot signal relative to a transition in the output enable signal.

8. (Original) The amplifying circuit of claim 1, wherein the operational amplifier includes a high-part amplifying sub-circuit and a low-part amplifying sub-circuit.

9. (Original) The amplifying circuit of claim 8, wherein the high-part amplifying sub-circuit has voltage follower configuration including a plurality of transistors.

10. (Original) The amplifying circuit of claim 9, wherein the high-part amplifying sub-circuit further includes at least one capacitor.

11. (Original) The amplifying circuit of claim 8, wherein the low-part amplifying sub-circuit has voltage follower configuration including a plurality of transistors.

12. (Original) The amplifying circuit of claim 11, wherein the low-part amplifying sub-circuit further includes at least one capacitor.

13. (Original) The amplifying circuit of claim 8, wherein the pull-up transistor is connected to the output of the high-part amplifying sub-circuit and the pull-down transistor is connected to the output of the low-part amplifying sub-circuit.

14. (Original) The amplifying circuit of claim 8, wherein the control circuit is operable to selectively control the pull-up and pull-down transistors, respectively, based upon an output enable signal.

15. (Currently Amended) A high slew rate amplifying apparatus for a TFT-type of LCD system, the apparatus comprising:

operational amplifying means;

pull-up means for pulling up the output signal of the operational amplifying means;

pull-down means for pulling down the output signal of the operational amplifying means;

control means for selectively turning on and off the pull-up means and the pull-down means, respectively, so that a combined operative duration of the pull-up means and the pull-down means is significantly shorter than an operative duration of the operational amplifying means.

16. (Original) The amplifying apparatus of claim 15, wherein the control means is operable to control each of the pull-up and pull-down transistors, respectively, to be turned on for one of the following: less than about 1/2 of the period of a polarity signal; or less than the period of an output enable signal.

17. (Original) The amplifying circuit of claim 16, wherein the control means is operable to control each of the pull-up and pull-down transistors, respectively, to be turned on for one of the following: less than about 1/20 period of the polarity signal; or less than about 1/10 of the period of the output enable signal.

18. (Original) The amplifying circuit of claim 17, wherein the control means is operable to control each of the pull-up and pull-down transistors, respectively, to be turned on for one of the following: less than about 1/200 of the period of the polarity signal; or less than about 1/100 of the period of the output enable signal.

19. (Currently Amended) A high slew rate ~~The amplifying apparatus of claim 15, wherein for a TFT-~~
type of LCD system, the apparatus comprising:

_____ operational amplifying means;

_____ pull-up means for pulling up the output signal of the operational amplifying means;

_____ pull-down means for pulling down the output signal of the operational amplifying means;

_____ control means for selectively turning on and off the pull-up means and the pull-down means,
respectively, the control apparatus includes; means includes at least the following,

_____ first one-shot means for providing a first one-shot signal that determines a duration that
the pull-up means is turned on; and

_____second one-shot means for providing a second one-shot signal that determines a duration that the pull-down means is turned on.

20. (Original) The amplifying apparatus of claim 19, wherein the first and second one-shot signals are based upon an output enable signal.

21. (Original) The amplifying apparatus of claim 19, wherein each of the first and second one-shot means includes at least one delay means, respectively, to delay turning of the respective one-shot means relative to a transition in the output enable signal.

22. (Original) The amplifying apparatus of claim 15, wherein the operational amplifying means includes high-part means and low-part means, the pull-up means being operable to pull-up the output of the high-part means and the pull-down means being operable to pull-down the output of the low-part means.

23. (Original) The amplifying apparatus of claim 15, wherein the control means is further operable for selectively controlling the pull-up and pull-down transistors, respectively, based upon an output enable signal.

24. (Currently Amended) A liquid crystal display (LCD) device comprising:
an LCD panel; and
a plurality of source drivers connected to the panel;
each of the source drivers including an output buffer;
each output buffer including:
an operational amplifier;

a pull-up transistor connected to the output of the operational amplifier;
a pull-down transistor connected to the output of the operational amplifier;
a control circuit to selectively actuate the pull-up transistor and the pull-down transistor,
respectively, so that a combined operative duration of the pull-up and pull-down transistors is
significantly shorter than an operative duration of the operational amplifier.

25. (Original) The LCD device of claim 24, wherein the control circuit is operable to selectively actuate each of the pull-up and pull-down transistors, respectively, for one of the following:

less than about 1/2 of the period of a polarity signal;
less than the period of an output enable signal;
less than about 1/20 period of the polarity signal;
less than about 1/10 of the period of the output enable signal;
less than about 1/200 of the period of the polarity signal; or less than about 1/100 of the
period of the output enable signal.

26. (Currently Amended) A liquid crystal display (LCD) The LCD device of claim 25, comprising:

an LCD panel; and
a plurality of source drivers connected to the panel;
each of the source drivers including an output buffer;
each output buffer including:
an operational amplifier;
a pull-up transistor connected to the output of the operational amplifier;
a pull-down transistor connected to the output of the operational amplifier;
a control circuit to selectively actuate the pull-up transistor and the pull-down transistor,
respectively, wherein the control circuit includes: including at least the following,

_____ a first one-shot circuit to generate a first one-shot signal that determines actuation time of the pull-up transistor₄; and

_____ a second one-shot rising circuit to generate a second one-shot signal that determines actuation time of the pull-down transistor₄;

_____ the first and second one-shot signals being determined as a function of the output enable signal.

27. (Original) The LCD device of claim 26, wherein each of the first and second one-shot circuits includes at least one delay unit, respectively, to delay a transition in the respective one-shot signal relative to a transition in an output enable signal.

28. (Currently Amended) The LCD device of claim ~~25~~ 24, wherein the operational amplifier includes a high-part amplifying sub-circuit and a low-part amplifying sub-circuit, the pull-up transistor being connected to the output of the high-part amplifying sub-circuit and the pull-down transistor being connected to the output of the low-part amplifying sub-circuit.

29. (Currently Amended) The LCD device of claim ~~25~~ 24, wherein the control circuit is operable to selectively control the pull-up and pull-down transistors, respectively, based upon an output enable signal.

<remainder of page intentionally left blank>